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The State Farmers' Institute held their annual meeting in the Senate Chamber at the State House on January 12. The meetings were all very well attended and the papers and discussions were unusually interesting. A large number of students was in attendance at the meetings and they often took part in the discussion. But the question arises, did they take enough upon themselves in this way; did they have enough to say upon subjects which lay along their lines of study, or did they make themselves too prominent? We think that the number of students who took part in the discussions was not as great as it should have been. We are here to learn facts to be sure, but we are also here to learn how to express them, and at such times as these, where we have an appreciative and critical audience, is the time to give vent to our opinions. The men who attend Institutes, the men who direct the thought of these bodies, are all Agriculturists, as many of our students will undoubtedly be, and why not begin now to

lay down the plans of action which we intend to follow up in our after life? We, the students of Agriculture, taken as a class, will have upon us some time the duty of leading in these lines and directing the thoughts of others along the lines of Agricultural research. Thus, to learn the facts and then to cultivate the methods of expression of these facts to others, should be one of the twofold objects of our education here.

Judging from the number of students enrolled, the course in dairying seems to be one of the most popular of the newer courses in college, and is gaining in numbers each year. The regular dairy students, or students taking the special course, now number thirteen, and beside these a large number of the students in the courses in Agriculture are taking advantage of the opportunities offered. The dairy laboratory is under charge of Professor Noyes, formerly of the University of Wisconsin; in the instruction in the laboratory he is ably assisted by Prof. W. D. Gibbs and Mr. Oscar Erf, a student in the long Agricultural course. The interest taken in the course is significant in showing the necessity of a technical knowledge of these subjects to the practical creamery man and farmer. To keep abreast of the times, these men in these industries must be thoroughly informed upon all the kindred subjects which concern their work.

Townshend's Anniversary.

The anniversary meeting of Townshend Literary Society was held on the evening of Friday, January 29. The exercises were held in the University chapel and a large and appreciative audience was in attendance. The different numbers of the program were presented by members of Townshend entirely, except the declamation by Miss Beattie and the quartette music, which was furnished by a quartette from the Glee Club, consisting of Messrs. F. M. Foster, first tenor; C. R. Aughenbaugh, second

tenor; J. F. Cunningham, first bass, and F. R. Hogue, second bass. The following program was well rendered:

Music, "We Meet Again To-night, Boys," quartette; president's address, Homer C. Price; poem, "The Ways of Life," C. W. Burkett; declamation, "Parson Jinglejaw's Surprise," Miss L. L. Beattie; solo, "Neta Titana," C. D. Darling; paper, "Man and Nature," John F. Cunningham; declamation, "The Building of the Ship," H. H. Loomis; music, "Nellie Was a Lady," quartette; dialogue, "Wanted—a Valet," W. H. Gilmore, L. N. Alvord, F. Rubins, J. E. Alpeter.

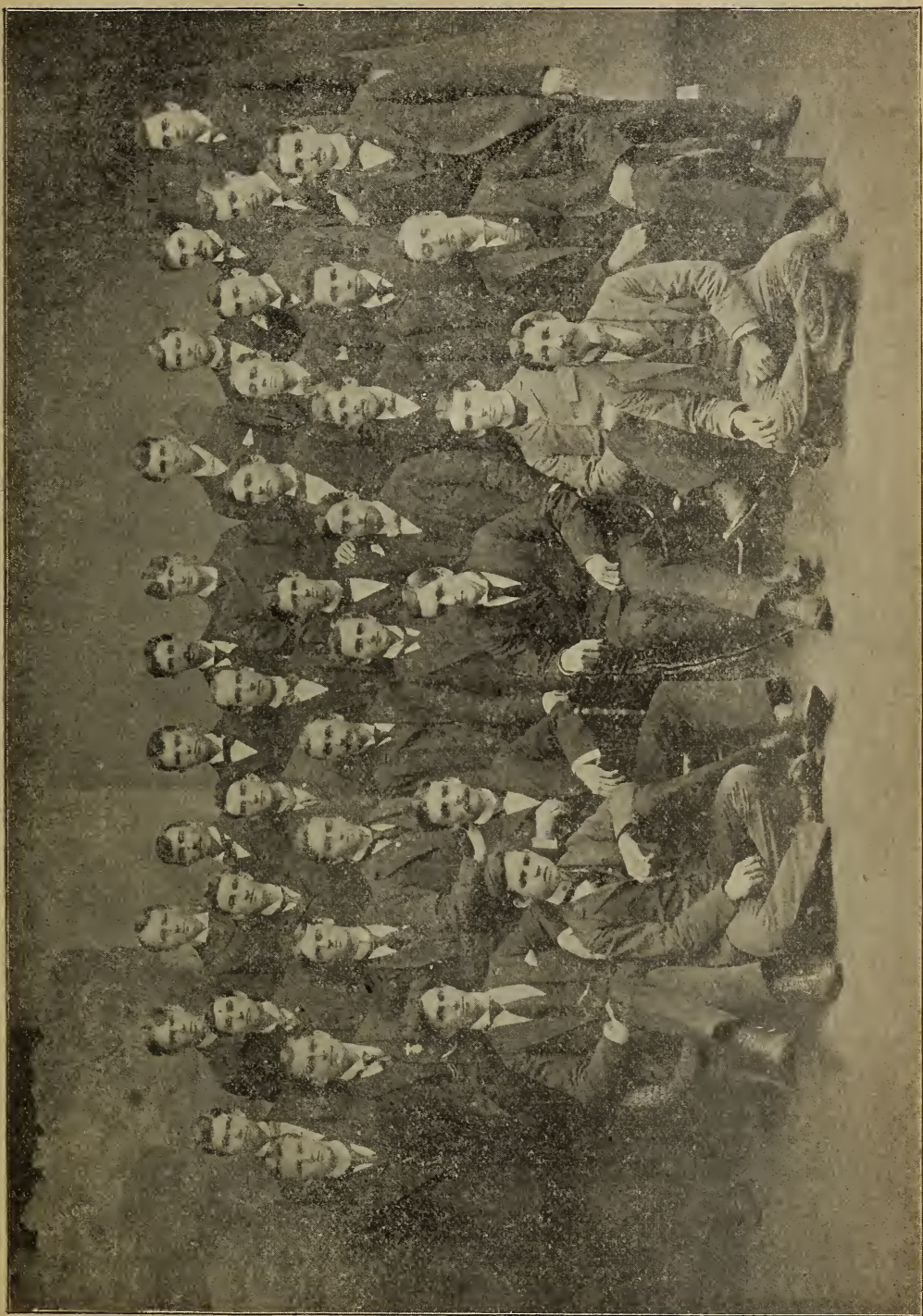
History of Townshend Agricultural Society.

Townshend Agricultural Society is an organization at the Ohio State University to which students of the college of Agriculture and Domestic Science are eligible to membership. It has existed under the present name for about two years. Previous to that time it was known as the Association of Agricultural Students. Its object was at that time to promote the interests of the Ohio State University and especially the school of Agriculture, and for cultivation in literary and social circles. Previous to 1892 the organization was known as Kirtland Society, and shortly after that date the members numbered about thirty. Besides the regular bi-weekly literary meetings the Association made the attempt to acquaint the sons of Ohio farmers with the benefits to be derived from taking an agricultural course at the University. This was done partly by individual students writing for agricultural papers setting forth these advantages, and partly by the students getting out a circular concerning the University and the courses in it. These were mailed to officers of Institutes and officers of County Agricultural Societies and to any prominent farmers. The object of this advertising was to stimulate a desire for high-

er education, especially among farmers' sons who expected to make farming their occupation; these efforts were not in vain, for steadily has the number of students in this department grown until now the College of Agriculture and Domestic Science has ninety-nine students. The literary meetings proved to be a success in every way, developing the power of public address, logical, and argumentative reasoning in the debates, and parliamentary law.

In February, 1895, the name of the organization was changed to Townshend Agricultural Society, in honor of the late Dr. N. S. Townshend. The character of the meetings remaining essentially the same, the exercises consisting of declamations, papers, essays, extemporaneous speeches and debates—all having a bearing more or less on the general subject of agriculture, but not so restricted. The society kept growing, and more interest was taken as the material at hand became more developed. Finally, during the spring term of 1896, the interval between the meetings was shortened to one week and the time of meeting was set for Friday night—the same hour that the other literary societies of the University meet. The results of this change have indeed been gratifying, as the members now have more opportunity of performance and thereby secure better training.

The place of meeting had always been in the Horticultural Building on the second floor, until the fall term of '96, when the Botanical Hall was secured as the place of regular meeting. Another recent change was the revision of the constitution, which was done during last term. The changes were: Rules requiring performance of literary duty when placed upon the program; a reasonable regularity of attendance; and including members of the Domestic Courses eligible to membership. At the first meeting in February the first lady members were elected; the membership is now fifty in round numbers.



TOWNSHEND AGRICULTURAL SOCIETY.

Quite recently the Society held its fifth anniversary in the University Chapel where an excellent program was rendered, which was a credit to the Society and an honor to the University. Prospects for her future are bright and a long life of success and usefulness is predicted for her. Many a student now rises up and calls her blessed when he makes his appearance before an audience, because she was the means of his getting rid of that timidity and embarrassment which is too characteristic of the average sturdy youth who has decided to make the occupation of his father his own—that of tilling the soil.

Notes from the Minnesota Dairy School.

Judging from the silence that is maintained in this “neck o’ woods,” in regard to the dairy school, one would naturally begin to think that no such thing existed; but such is fortunately not the case. We are, and have been, in full blast for several weeks. During the fall and early winter we had nothing to say in the public press, or otherwise, in regard to our school. We kept silent hoping by this means and by limiting our number, to those that had one season’s factory experience, we would reduce the total to fifty, or at most to sixty-five. In this we have been disappointed, for there are ninety-three enrolled in the dairy school class, which does not include those attending the school of agriculture which now has attained to a student body number 334, making in all 429 students. It is exceedingly fortunate that no effort was made to get students, for we now have about 150 more than we can accommodate in the dormitories and the surplus we have to provide rooms for in the private dwellings and hotels in and about St. Anthony Park.

Our plan of restricting the students in the dairy school to those that have factory experience has given us a class of young men that any institution may well feel proud of. The high standard of intelligence, the earnestness of pur-

pose, and careful attention to details on the part of the students, makes lecturing and instruction so pleasant, that we are enjoying this term more than we have any of the previous ones. As you know, I have been in dairy school work from its first inception and am quite familiar with the trying ordeal that the officers and instructors had to go through during the earlier sessions. Our work is so thoroughly systematized and the instructors so thoroughly trained, that the terms step by step with scarcely any worry or friction.

We have been exceedingly fortunate during the past two years in providing our students with good positions. Two years ago we secured positions for all our boys and then had to send to Wisconsin and Iowa for quite a number of young men qualified to operate creameries. Last year we assigned all our boys, who were qualified to take charge of creameries, to positions paying from \$50 to \$90 per month. However, we make no promises in this direction, but always feel in duty bound to serve them and the public, and since communities, that are starting new creameries, look to us for butter and cheese makers and the makers who have attended the school are in want of places, my office has gradually become a sort of intelligence bureau, not only so far as makers are concerned, but also as to methods of organization of creamery associations, kind of buildings and how to equip and manage such enterprises. This work extends over the entire northwest, the Canadian Provinces in the northwest and the Pacific coast. Scarcely a day passes that I do not receive letters touching these matters. So if we do not have much to say in public print, we are, nevertheless, doing.

Yes, sometimes I think we are doing too much. Seven and a half months in the class room, planning and supervising experimental work, showing through our institution some two thousand visitors per year, holding some seventy dairy meetings through the state, speaking to some half dozen conventions in other

states, attending to a heavy and constantly increasing mail, are duties that make deep inroads on our nervous system, and will, in time, make us realize that there is a possibility of undertaking too much; and judging from the large amount of original work that we find each week in the Dairyman, we are led to believe that this danger is not confined to station and dairy school workers.

T. L. HAECKER.

Minnesota Dairy School.

—Hoard's Dairyman.

Chemical Manures.

In manuring, it depends greatly upon the condition of the soil and partly on the crop grown as to what fertilizer or combination of fertilizers to apply.

If there is a sufficiency in the soil and in available form of the fertilizer applied, there will be no increase of the crop, but if there is a deficiency in that one element alone, its application in however small a quantity will result in a large gain in the crop.

This is one reason of the wide difference in results in using chemical manures, and also causes waste in quantity applied and consequently increased cost.

Frequently half a ton is used when a much less quantity would produce as good, if not better, results.

Sometimes a fertilizer is applied which, coming in contact with another element in the soil, neutralizes it, and the fertilizer is rendered valueless, and its cost lost by ignorance in regard to the action of the chemicals.

Farmers who are interested in growing crops cheaply and successfully (and what farmer is not?) should apply soil tests to their land, that they may know what their soil most needs, and, with proper application, what crops would be most profitable to grow on that soil.

Soil tests will show that some lands, not now favorable to large crops of corn, can be made so at a trifling expense; and the same in regard to wheat—the land can be made to produce a larger crop and

more profitably, if it is known what the soil lacks.

Soil tests furnish this information, and every one interested in agriculture may learn of his own knowledge and under his own eye what his soil needs and what his crop wants.

Until farmers know what their soils lack and what their crops want and the effects of the constituents used for their growth separately and combined, a rational system of manuring is impossible.

OPENING ADDRESS

Of President Lazenby, Delivered Before Farmers' Institute at Columbus, Ohio,
January 12, 1897.

Members of the State Farmers' Institute:

I bid you a cordial welcome to this annual meeting. The custom, which appears to be firmly established in this state, of meeting once a year in the Capital City, is an equally pleasant and profitable one. The fundamental object of our meeting is to elevate the character and advance the interests of the arts of Agriculture and Horticulture. But our meeting should mean more than this. For each one of us individually, the State Farmers' Institute should stand for good fellowship, good citizenship and good scholarship. It should be the model Farmers' Institute of the state. In renewing old and forming new acquaintances, our social instincts are developed and gratified; in the free and full discussion of important economic questions we can scarcely fail to become braver, better and more useful citizens; and we cannot bring mind in contact with mind without evolving thought.

One of the greatest needs of the farmers of Ohio to-day is an intellectual awakening. We need to mingle more thought, more study, with our work. We need a larger knowledge, a fuller command of science. It stands to reason that the more a man knows the more he can do; the more deeply and clearly he can think; the more economically and advantag-

ously he can work. Some men think until the brain becomes feverish and overworked; others labor with the hands until the body becomes bent and prematurely aged. This is all wrong. The thinker and the worker should be one. This is particularly true of those engaged in the arts of Agriculture and Horticulture. The wand of science has made farming and gardening intellectual pursuits. It has taught us that this is a world of law; and that each event in nature is the logical sequence of the events which preceded it.

On the other hand, men who have mastered the arts of Agriculture and Horticulture will tell us what they have learned by practice and experience. Science and art, theory and practice, will go hand in hand, and the joint work of these cannot fail to result in substantial progress. Perhaps the assertion ought not to be made, but I cannot rid myself of the belief that the Agriculture and Horticulture of this country are very far below the standard which they should ere this have reached. In an age where every child may be fairly educated if he will, an age of institutes, societies, schools and colleges, there ought to be more matured fruit gathered from the tree of knowledge and science.

Members of the State Farmers' Institute, there are two things that we should constantly keep in mind. The first is the improvement of the Agriculture and Horticulture of the state, and the second is the elevation intellectually, socially and morally of the whole agricultural community. This annual State Institute ought to stand for the best science, the best theory, the best thought and the best practice for the farm, the dairy, the garden, the orchard and vineyard. It ought to be one of the strongest, grandest organizations in the state, a great center of light and influence.

You will notice that the worthy secretary of the State Board and his able assistant have prepared a feast of good things for the three days that most of you will be here. In addition to the papers

which will be read and the discussion that will follow each paper, a list of questions has been prepared which covers a wide range of interesting and suggestive topics. It is hoped that there will be ample opportunity to consider the most important and timely topics of this list. But in order to do this we shall be obliged to resort to a pinching economy of our time. We must strenuously avoid all irrelevant talk, all straying into the forbidden paths of personalities, partisan politics or sectarian religion.

As presiding officer, I shall be pleased to recognize any one, even the youngest and humblest, who can shed any light on the subject in hand, but I shall promptly call to order any one who does not confine himself strictly to the question before us. This is the only way to dispatch business and secure equal privileges for all.

I congratulate the Institute upon the attendance at the opening session. I am also pleased with the evident earnestness and enthusiasm that is manifested. Coming together in this spirit, we can scarcely fail of having an Institute that shall be a signal and all-inspiring success.

Advice to Farmers.

The matter of direct shipments of grain by producers has got far past the experimental stage. The letters from farmers who tried shipping their own grain to Chicago on file in our office would fill one end of a freight car. Some state they have made \$10; others \$20; some \$50, and one wrote that he had made \$100 on a car of wheat. The letters of inquiry from these and other farmers who have not tried direct shipments would fill the other half of the car. The printed matter (in six different languages) sent out from this pioneer house in advocating farmers' shipments would fill several cars. The money spent in pushing this Farmers' Commission House plan of direct shipments to bring farmers in touch with the Chicago

market would be called a good-sized fortune. The time and energy employed in advocating independent shipments exceed by far any expectation at the start of the undertaking five years ago. Farmers who first attempted independent shipments met with tricks on the part of the local grain buyers. A favorite plan was to bid up and take the farmer's car after he had loaded it, or bid up to make him dissatisfied when he got his returns. Railroad agents were inclined to favor the buyer at the station, and either did not order cars promptly for farmers or made trouble by having cars switched in the wrong place to load. Appeals had to be made to railroad officials in Chicago. Appeals had to be made to ship to Chicago regardless of everything when once undertaken. The whole Chicago system of state inspection, official weights, legal bushels, the sales in open markets by samples, the payment of freight by us here, the remittance by Chicago draft, the mailing of printed price lists or market reports, all had to be gone over and over until it was plain and simple to the farmer. The profits of the middleman (the country buyer) had to be figured out and explained; the difference between a one-man market for each wagon load at the home station and a world's competitive market in Chicago for car lots had to be made clear. The idea of marketing in a modern way the crops raised by improved machinery required argument and persuasion. The whole aim has been to bring farms and farm prices closer to Chicago prices; to have producers save what they have for years given to the middleman; to have farmers do a little head work in shipping and reap all the profit of their months' of labor in raising the crop. But the time and labor and money have not been in vain or thrown away. The producers over ten states in the sweep of territory from Wisconsin across the Mississippi to the Dakotas, south to Kansas and east to Indiana show of this new money saving method—direct shipments to the Chicago market. Each of the one thousand

farmers who have asserted their rights and tasted the profits has started ten or twenty others at the same shipping point talking and thinking. Low prices in many states have made this matter almost a necessity. The letters from a thousand points tell of shipping plans for the future. Farmers are taking things into their own hands. No association of grain shippers on earth can check this independent movement of thinking farmers; they want to sell in the market of the world; they want an end of middlemen between the farm and Chicago prices. The money in it for producers will make it go without any more pushing by the house which originated the big money saving plan. Every true reform starts small—starts with the thinkers and leaders in scattered communities. After years of natural growth the move will sweep the country. It will be the modern way, and the middleman, who has collected heavy taxes from farmers, will disappear. The farm must get nearer to the central market. The farmer must unite his headwork of a day at the station (marketing direct and intelligently), to his back and leg and arm work of months on the farm; then he will obtain all there is in the products he raises. The natural outcome of the "farmers' house" shipping plan will be a joining of producers' hands for commercial and political changes. Farmers, are you getting in line for present profits and future good?

H. H. CARR & CO.,
The Farmer Commission House.

What is Stable Manure ?

In former times, the excrement of domestic animals was the only plant food at the command of the farmer; it was the only dependence, and its use has not ceased, for it is still largely relied upon, although it is now generally used in conjunction with other fertilizers, as a sort of foundation upon which to build. It is still one of the most important fertilizing materials and it is more universally used

than any other single substance. It is surely entitled to receive the first consideration.

Barn manure is a general term covering the mixture of the excrement of cattle, horses and swine, or that of cattle and swine only, or that of cattle only. Horse manure, when kept distinct from the general mass, is separately classed, and is used for special purposes. On the ordinary farm, manure is a mixture of the excrement of the leading farm animals. There are several striking characteristics that are peculiarities of barn manure. The most noticeable of these is the large quantity of vegetable matter it contains; and incidentally the large amount of water. This organic matter is the greatest peculiarity of manure, and from it certain effects are produced in the soil that cannot be obtained from any other fertilizer.

Another peculiarity is that manure is a complete fertilizer; it contains some of every element that is required by growing crops—nitrogen, phosphoric acid and potash, as the more important plant food elements, as well as lime and magnesia. A third peculiarity is the variability of the quantities of these food elements, depending upon the classes of animals contributing to its formation—cattle, horses and swine—some one or two of which may be absent; upon the fodder rations employed in feeding the stock; upon the export of milk from the farm; upon the quantity of foreign matter incorporated as bedding, or absorbents; upon the percentage of the urine and dry excrement, and upon the way in which it has been preserved, whether properly housed, or exposed to the leaching of rains and winds.

The value of manure as a fertilizer has been appreciated for generations. The investigations of science have not displaced its standing, or curtailed its use. For it is both the cheapest, and, all things considered, the best general manure at hand. It will always be used whenever the soil requires fertilizing, and where live stock is kept.

The feed has a great effect upon the quality of the manure. In its passage through the animal, the food loses what is taken out by the growth of the animal and by the milk. A good deal of carbonaceous matter, which has no fertilizing value, is also burned in the system to supply animal heat, but all the rest of the food passes into the dung or urine. The waste of the digested food is voided in the urine, the undigested in the solid manure. Of the two, the urine is the more valuable; it is also more difficult to preserve. Other things being equal, the richer the food, the richer the manure. Nothing is added to the manure in the process of the feed going through the animal. You can get in the manure only what there was in the feed, less what the animal used, and you won't get that unless both solids and liquids are preserved. If you feed swale hay you get swale hay manure; if your stock is fed with rich feeds like cottonseed meal and bran, their manure is correspondingly richer in plant food.

A ton of manure from ordinary farm stock, not well bedded with chaff to absorb the urine, this being worked into the pile of solid excrement, will contain about 1,350 pounds of water, 475 pounds of organic matter and 175 pounds of ash. The latter contains, of potash 11 pounds, phosphoric acid 8 pounds, lime 6 pounds, magnesia 4 pounds, and the rest is sand, carbonic and sulphuric acids, iron, alumina and soda. The organic matter (that portion which will burn off at a high temperature when perfectly dry) contains about 10 pounds of nitrogen. Manure from poorly fed stock, especially if absorbents are not used on the manure pile, if exposed to the weather, may not contain half these quantities. On the other hand, richly fed stock, carefully bedded, may yield manure twice as rich in plant food as the average just stated.

Agricultural Training at the Ohio State University.

I feel a great hesitation in discussing this subject. If anything good can be

said of the agricultural training of the Ohio State University, it would be much more pleasing to have it said by some one else than by those who are in a measure responsible for the conditions which exist. I am aware that my hesitation is ill-conceived.

The University does not belong to the officers and instructors therein, except so far that they are citizens and taxpayers. The University belongs to the state. The University is yours. The officers and instructors of the University are your employes. We are, in the language of our president, your hired men. You have a right to ask for an account of our doings. When, therefore, the worthy Secretary of Agriculture insisted upon my presenting this subject at this time I could not well refuse.

If you pay taxes you are interested in the University, because your money is used to support the institution. The University now enjoys an income of about one-fourth of a million dollars annually, and while this is a tax of only about six cents per capita, yet in the aggregate this large sum may become an engine for great good or great evil. It is the interest of every citizen to know that the sum is judiciously expended, although he may feel but little interest in his own individual contribution. A man who pays taxes on a valuation of \$2,500 contributes twenty-five cents annually to the University. But this is decidedly the lesser interest which every citizen should feel in the University. Every citizen who is interested in the youth of the state should be profoundly interested in the welfare of the University. Every parent who has a child to educate is doubly interested in the welfare of the University, whether that child ever gets to the University or not, because the University is but a part of the educational system which extends to every primary school in every hamlet and district of the state.

The University was founded in accordance with the Land Grant Act of 1862. This act states that "the leading

objects shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to Agriculture and the mechanic arts in such manner as the Legislatures of the several states shall respectively prescribe in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

It may be well to observe here that the purpose of this act is to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life. This act does not require the teaching of Agriculture and the mechanic arts as such, but requires the teaching of such branches of learning as are related to Agriculture and the mechanic arts in order to promote the liberal and practical education of the industrial classes.

The endowment under the Land Grant Act of 1862, and the subsequent grant of Military Lands in 1871, amounts to \$33,000.

The University was established in 1870 at Columbus, and was secured by the citizens of Franklin county by offering \$300,000 for its location. This money secured the farm which now contains 345 acres, and built the main building. The total appropriations by the state from 1870 to 1890, or during the first twenty years, were \$350,000. In 1890 the so-called Second Morrill Act was passed by the National Congress, appropriating \$15,000 for the first year, and an additional sum of \$1,000 each year, until \$25,000 was reached. The University received \$21,000 last year under this act. This money is "to be applied only to instruction in Agriculture, the mechanic arts, the English language and the various branches of mathematical, physical and natural and economic sciences, with special reference to their application to the industries of life and to the facilities for such instruction."

In 1891 the state recognized the Uni-

tem by amending the law relating to public schools in such a manner as to give one-twentieth of a mill on the tax duplicate to the University. These two acts caused a very large development of the University. In 1891, when the first Hysell bill was passed, the University employed thirty-eight instructors, and had 493 students, over one-third of which were preparatory students. In 1896 the University employed seventy-two instructors, not counting instructors in the College of Law, of which there were nine, and had 968 students, about one-fifteenth of which were preparatory students. In 1891, there were thirty-one students in the courses in Agriculture; in 1896 there were eighty-three.

As a result of the Hysell act of 1891, the Geological building, known as Orton Hall, and the manual training building, known as Hayes Hall, at a combined cost of \$150,000 were erected. The University now has over eighty instructors and thirty-three departments of study, offers twenty-five distinct courses, all but one of which require two or more years for their completion, and has nine large buildings devoted to instruction. The lands, buildings and equipment are estimated to be worth over \$2,000,000, although the total appropriations from all sources during the twenty-six years of the University's existence has been less than this sum. Senator Hysell introduced into the last Legislature a bill whereby as part of the public school system increasing the mill tax from one-twentieth to one-tenth of a mill. The University will hereafter receive \$170,000 from the state, making its total income about \$250,000. At the same time Senator Williams introduced a bill allowing the University to issue bonds in anticipation of this levy. With a portion of this money the Board of Trustees are building three new and much needed buildings on the University campus. An Agricultural building at a cost of about \$75,000, which will bear the name of the late Dr. N. S. Townshend as a memorial to his public service and his work

in advancing the cause of agricultural education; an armory gymnasium, at a cost of \$60,000, and a biological building, at a cost of \$30,000.

The income and the expenses of the University for the year 1896 were \$175,000; \$55,000 was received through acts of the general government, about \$90,000 through acts of the state government, \$22,000 from fees, and the balance from minor sources. In addition, upwards of \$20,000 were given by Emerson McMillin and other public-spirited men. Of the \$22,000 paid in fees by students, something over \$5,000 was paid in fees by 100 law students. The remaining students, a little less than 900, paid \$17,000 in fees. In other words, for every dollar that the student or his parent or guardian paid for instruction at the University, the state expended upon the student \$10. Is it a good business proposition for one who has a child to educate to send him to a University where \$10 will be expended upon his education for every dollar he gives in return?

Aside from the Law School, which is nearly self-supporting, the state is expending on the education of its sons and daughters at the Ohio State University nearly \$200 per capita, but the student is getting far more than \$200 worth of instruction. There are 1,200 hours of instruction given at the University each year; each student pursues on the average about fifty hours; he thus takes one-twenty-fourth of all the instruction given, which costs the state over \$7,000. While the average fee to the student is about \$20 per year, the Board of Trustees offer two Free Scholarships from each county in the state. These scholarships are good for the two years' course in Agriculture, and cover all fixed dues.

There are two classes in this state. One class thinks that the University teaches no Agriculture, the other thinks that the University teaches nothing but Agriculture. Both classes are mistaken. While it may be immodest for me to say so, the University teaches a great deal of Agri-

culture; in this respect it compares favorably with any other institution in the country; but while it teaches much Agriculture, it also teaches much of many other things.

The Ohio State University is divided into six colleges, as follows:

- College of Agriculture,
- College of Arts, Philosophy and Science,
- College of Engineering,
- College of Law,
- College of Pharmacy,
- College of Veterinary Medicine.

Each of the above named colleges is under the direction of its own Faculty, which has power to act in all matters pertaining to the work of the students in that particular college.

The College of Agriculture offers six distinct courses of study:

1. A 4 years' course in Agriculture.
2. A 4 years' course in Horticulture and Forestry.
3. A 4 years' course in Domestic Science.
4. A 2 years' course in Agriculture and Horticulture.
5. A 2 years' course in Domestic Science.
6. A special one-term course in Dairying.

The four-year courses of the College of Agriculture are courses of higher education in just exactly the same sense as the so-called classical course is a course in higher education.

The Land Grant Act of 1862 required that there should be established a college, not a school. The four years' course in Agriculture not only gives instruction in Agriculture, but in such branches of learning as relate to Agriculture and that will promote the liberal and practical education of those who devote themselves to farming. For example, the four years' course in Agriculture consists of about one-third technical Agriculture and one-third science, and one-third English and other languages, philosophy, history and economic science. The facilities for instruction in

science are elaborate and thorough, and the instruction in language, philosophy, history and economic science is given by men who have devoted their lives to the study of these particular branches. But of what does this technical Agriculture consist which occupies one-third of the student's time in a four years' course, and about one-half of a student's time in a two years' course? A student, returning from his Thanksgiving vacation, said to me: "When I go home, people ask me what I am studying. I tell them I am studying Agriculture. They reply, 'You are studying Agriculture?' 'What's that?' 'What do you study?'"

It is impossible in a paper of this character to state fully of what technical Agriculture consists; I can only give examples. The student studies the soil, is taught to analyze the soil; he studies its physical properties, finds the number and size of the grains in the soil. He finds from this study that the exterior surfaces of a cubic foot of soil may equal three acres, and that soils differ largely in this particular, and the power of crop production depends in a measure upon this fact. He finds for himself from actual trial that an important difference between the rock and the soil is the fact that the rock is solid and that one-half of the space in the soil may be unoccupied by soil particles. The student is taught the use of fertilizers and how to calculate their value. Is taught the manner and methods of drainage and irrigation, and of tillage, and the effect and use of various farm implements upon such processes. The history, use, and culture, climate and soil adaptation, harvesting and marketing various varieties of farm crops are carefully studied. Kinds, care and management of live stock is taught. The student is taught the characters that each class of animals should possess for special purposes, and by means of score cards, students are taught to judge the various classes of live stock. As an illustration of what may be done in this line, thirty students of the University judged six cows from the

herd of a leading showman in this state. After the students were through, he stated to me that he would sooner risk his cattle in the hands of those students than in the hands of any of the judges at the eight county fairs at which he showed his cattle this season, yet most of these students had but two lessons in judging this particular class of animals, in addition to a couple of lectures upon the subject. The student is taught the principles of breeding and mating animals, and is taught to understand and properly interpret pedigrees. He is taught the principles of feeding and how to calculate feeding rations which will bring the best results with the foods at hand and for the purposes used. Butter and cheese making and testing and pasteurizing milk is most thoroughly taught with ample facilities and expert instructors. Three thousand feet of floor space are already devoted to the machinery and apparatus for this purpose, and Townsend Hall, which will be ready for use next year, will contain 6,000 feet devoted to machinery and apparatus for instruction in butter and cheese making, testing and pasteurizing milk, and management and operation of boiler and engine. No handsomer suite of rooms can be found anywhere in America for this purpose than will be found in this building. Fruit raising and vegetable growing, and greenhouse work are thoroughly taught. In addition to the large gardens, lettuce, radishes and tomatoes and other vegetables are raised by sub-irrigation, under glass. Grafting, budding, cross-fertilizing, trimming and other technical work of the horticulturist, the student is taught to do. Both forestry and floriculture are given special study. Diseases of animals, diseases of plants, insect enemies and insect friends receive proper attention and methods of treating diseases and combatting insect enemies by spraying and otherwise, are amply taught. The skill which students acquire in the forge shop and in the carpenter shop, working but six hours per week for ten weeks, is truly remarkable.

But these things must be seen to be fully understood. I will not tire you by giving more examples, but suggest that you take this opportunity to visit the University and see for yourself the work that it is doing.

Few men are content to buy a driving horse, or even a bunch of swine, without seeing them, but many seem content to send their sons and daughters even to a university or college which they have never seen.

The most important feature of an institution of learning is its students. The finest saw-mill in the world may be running and making great noise without sawing any logs. Sometimes machinery makes more noise when it is running empty than when it is at work. A saw-mill that has no logs to saw would not be a success. A University must have logs to work into finished material or it is not a University.

The College of Agriculture of the University last year contained eighty-three students; of these thirty-eight were in the four-year courses and thirty-four in the short courses. During the year, five students were appointed to positions in colleges and experiment stations; five were employed in creameries, cheese factories, or dairies; a larger number engaged in farming. In this connection it may be well to state that while we do not have any system of compulsory student labor, a large part of the work of the University farm is done by students. The farm pay-roll for the year 1895, the last which we have summarized, shows that eighty-nine students received employment during the whole year, which includes the vacation months. One student, Mr. Imes, earned \$300; 4 students earned between \$200 and \$300; 5 students earned between \$100 and \$200; 12 students earned between \$50 and \$100; 8 students earned between \$25 and \$50; 15 students earned between \$10 and \$25. The total amount paid to eighty-nine students was \$3,858.77; in addition to this there was paid \$877.92 to students for work on campus. These

figures do not include the amount paid to students in the horticultural department or in other departments of the University, which in the aggregate is considerable.

In closing, I wish to state briefly that the courses in the College of Agriculture, as well as the other colleges of the University, recognize that the student should be taught both to do and to think. In the language of President White, of Alabama, "in handcraft and in readcraft." We recognize that the students coming to us as they do from the farms, have had better training in handcraft than they have in readcraft; they have been taught to do more thoroughly than they have been taught to think. I believe that the students who come to us to study Agriculture, having been already more thoroughly trained in doing than in thinking, it is our duty to lay special emphasis upon thinking, while not neglecting the other important educational factor, the doing. The courses in Agriculture are also based upon the fact that most of our students who take this course have been reared upon the farm. These courses are not designed to take the place of education upon the farm, but to supplement it. These courses of study do not give the student who lives in the city and knows nothing of farming sufficient instruction to make him a successful farmer. Such a course might be devised, but to do so would be to waste a portion of the valuable time of nine-tenths of the students who come to us for instruction.

The Tuberculin Test for Tuberculosis in Milch Cows.

Heretofore, in dealing with such chronic contagious diseases in our domesticated animals, as for instance, Glanders in horses or Tuberculosis in cattle, we have been considerably hampered by not being able at all times to recognize them in their latent, hidden forms. All that modern developments have given us in the way of special instruments and mechanical devices to

help us determine the presence of diseases in inavailable internal organs in the animal body have been only useful in a small percentage of instances. Especially in our animals is physical diagnosis difficult in chronic, hidden disease. Although in more pronounced cases Auscultation (the stethoscope) and Percussion (the hammer), the irregularity in blood temper (thermometry) and more rarely the pulse, may tell us that there is lurking within a lung a nest of contagion in by far a greater number, no one, if his five senses be ever so acutely developed, can discover its presence.

The disease Tuberculosis, the diagnosis of which I shall treat briefly, usually presents itself in a latent form. It is a slow, wasting disease; a "pestilence that walketh in darkness;" and, as a venerable and esteemed colleague rightly says: "Often under an outward guise of health the subject of the disease carries around germs of death to his unsuspecting and more susceptible fellow." The very propagation of Tuberculosis seems to depend upon its latency. Acute diseases in our cattle like Anthrax or Texas fever present a bold front, manifest well-marked symptoms, their victims soon succumb; hence, well-directed veterinary police measures can readily and comparatively easily cope with them and crush them out. To effectually stamp out forever any infectious disease we must seek its source. To destroy the source must be to destroy the disease. In Consumption of our cattle the source of the disease (the germ) is always harbored in an affected animal. One may possess a perfectly healthy herd of dairy cattle, he may introduce into this herd an apparently sound cow which may carry in its lung a few Tubercular nodules, the presence of which no expert could unearth. This infected animal can, however, transmit the germs to those standing next her in the stable, and from them to their neighbors, etc., if they only be kept living together for a long enough period of time, until, perhaps, 25 50-100 per cent., depending upon the

sanitary conditions of the stable, the food and care the animals receive, become victims of the disease. When Consumption was thought to be due to bad sanitary arrangements alone, dirt, dust, improper food, etc., efforts were made to circumscribe and combat the plague by butchering those animals presenting well-marked clinical symptoms: i. e., those in which the disease had become acute or from the morbid processes having undermined the animal's whole system, making it appear a thin, emaciated, hide-bound, coughing object of ill health. To this was added a disinfection, a spreading of certain chemicals about the stable. Such methods were never availing of much result. It was usually not long before another cow would "go the same way."

Not so much from the acute cases is Tuberculosis spread, as they soon die, but from the chronic, latent ones. Up till within the past few years, with the exception of a few sporadic attempts at preventing the spread of Consumption in foreign countries and in our New England states, little has been done towards the eradication of this "White Plague of the North."

Up until 14 years ago the cause of the disease was shrouded in mystery. In 1882, R. Koch announced to a gathering of physicians in Berlin that he had discovered the true and only cause of Consumption in man and animals to be a microscopic plant of low order—the *Bacillus Tuberculosis*. Though often assailed, this assumption has never been disproven. At the present time it is even accepted by a large part of the laity that to have Tuberculosis we must have the *Tubercle Bacillus*. Without this germ no Consumption. Having determined the cause of Consumption, Koch turned his attention towards finding a cure, and a few years later he announced that by inoculating phthisical patients with a product of the germ which he called Tuberculin, he could induce a healing, respectively an encapsuling of the Tubercular lesion. His efforts

have, however, not been crowned with success. At the Veterinary Institute in Dorpat, Russia, in 1890-91, Tuberculin was tried on notoriously Tubercular cattle to note its effect upon consumptive animals. A raise in temperature in every case of two degrees F. and over, above the normal, first drew the attention of Veterinarians to its value as a diagnostic agent. In non-tubercular cattle there was no raise in temperature manifest.

Since that time thousands of cattle have been subjected to a Tuberculin test and in nearly every case the value of this product of the *Bacillus Tuberculosis*, as a diagnostic agent, has been confirmed. The technique of the manufacture of Tuberculin may be omitted here. Suffice to say that it is the toxic product of the germ of Consumption, and if properly prepared, contains none of the bacilli themselves. It can, therefore, in no case induce, cause or transmit the disease in any form. Tuberculin is simply a chemical constituent, an insensate substance, and cannot increase itself in the animal body as a living micro-organism has the power to do.

Professor Bang, of Copenhagen, Denmark, a close student of animal Tuberculosis for many years, has since 1891 been trying to eradicate the plague from that little kingdom of 2,200,000 souls and 1,960,000 cattle. In his battle with grim phthisis this agent alone, he says, has placed him in a position to discover Tuberculosis in its hidden forms. Since he began his work 53,303 cattle have been subjected to a Tuberculin test, of which 20,665 reacted and were found Tuberculous. The effect of Tuberculin upon Tubercular cattle, as to whether their condition was made worse or not by its use, has often been questioned. To determine this point, Dr. Bang made post-mortem on 83 Tubercular animals that had been subjected to repeated Tuberculin tests.

Notwithstanding that among these 23 were affected in a high degree, in only

four cases was an acute miliary (embol-
io) Tuberculosis apparent.

Even a localized Tuberculosis was not made general in spite of the fact that the cows had been tested several times. We must also bear in mind in this connection that a chronic Tuberculosis can at any time become an acute miliary one and lead to a hasty death.

Tuberculin is not an infallible agent. We are at times led by its use to make a false diagnosis. These false diagnoses are of two kinds. Either Tuberculin causes a reaction where the animal is not Tuberculous, or there is no raise in temperature when the disease is present. Dr. Eber recently made autopsies upon 503 animals, condemned as being Tubercular with the Tuberculin test. The diagnosis was confirmed in 489 instances, while in 74 cases the lesions of the disease were not found. In Denmark 515 post-mortems showed 50 false diagnoses. My own experience has been that wherever Tuberculin caused a raise in temperature in an animal to exceed 2 degrees F., Tuberculosis was present, but at times notoriously Tubercular cattle do not react to the test. At the present time, however, Tuberculin must be considered as the most valuable diagnostic agent that we possess and by its use alone are we placed in a position to discover and control consumption in cattle.

Tuberculosis in our bovine herds is the most generally prevalent and widely distributed of plagues. No country where cattle raising and dairying are a source of wealth is free from its ravages. Especially in lands and districts where cattle cohabit together through a long period of time does it seem to flourish. In localities where cows are kept for dairy purposes to supply milk for human food, the germ of Consumption finds a fertile soil upon which to grow and perpetuate itself. While the young beef cattle of the plains and pasture lands are comparatively immune, in the more densely populated, milk-producing sections of a country, a large percentage of the milch cows are affected. To give

exact statistics as to Tuberculosis' prevalence among cattle in our land, would be at this time impossible.

From Dr. Ostertag's observations at the Berlin slaughter house, it would seem that few old milch cows are free from the disease. He found 75 per cent. of these old dairy veterans harboring Tuberculosis. In Denmark the production of milk, butter and beef, is the chief source of wealth and prosperity, and in this country nearly 40 per cent. of the cattle have been found to be Tuberculous. The larger the herd the more extended has been the disease. The longer the disease exists in a herd the wider will be its distribution. Of one herd of 208 animals, 80 per cent. of the milch cows reacted to a Tuberculin test. One dairy herd tested by myself in Ohio showed 32 per cent. to be affected.

The germ of consumption does not seem to be everywhere. Tuberculosis is then not a necessary evil.

Two herds of the red Danish race, that were fine specimens of their type, of 38 and 39 head respectively, were found to be absolutely free from the disease. In these herds in-and-in breeding had been extensively practiced. A large number of the animals had descended from one cow, purchased as far back as 1862. Though the conditions in these instances would seem to favor the development of Tuberculosis, this herd has always been free from Tubercular taint. In the district of Argenmuende, Germany, among 13,000 head of cattle slaughtered, none were found to be Tuberculous; and in the district of Telton, among 40,000 head killed, only 15 cases appeared. On the other hand, in the German empire on an average, 16 to 25 per cent. of all the cattle killed at slaughter houses have been found to be consumptive.

Although I do not wish to maintain that in the United States the condition of affairs in regard to bovine Tuberculosis is as bad as in older countries, it is my impression that the time has come when something should be done to con-

trol this plague that is always a threat to man and a foe to the cattle industry. I will not touch at this time upon the relationship of animal to human Tuberculosis. Suffice to say that Consumption of man and beast is one and the same disease, caused by one and the same bacterium and that it is transmissible mutually from beast to man and from man to beast.

Although the natural infection of man from the animal in Tuberculosis has been somewhat exaggerated of late, that such transmission does occur and is always probable, no man who has given this vast subject thought can honestly deny.

Though from the flesh of a tuberculous animal, if the disease be generalized, an infection can take place; from the internal organs (viscera) and milk is the disease most commonly transmitted. It has been demonstrated that in the milk the germs of consumption have been found, even if the udder be apparently intact; and though the bacilli do not multiply in milk, they can, nevertheless, use this fluid as a convenient means of transportation and to infect susceptible individuals.

Calves and hogs are most commonly infected through bovine milk, and in Denmark, where milk of cows is used to fatten colts, Tuberculosis in horses is not a rare disease. In other countries equine consumption is almost unknown. In calves, hogs and Danish horses the disease appears usually as a "feeding Tuberculosis" of the bowel and mesenteric glands, with secondary nodules in the lungs. It would seem then to be indicated that these sources of Consumption should be controlled. Against Tuberculous organs in milk a sanitary war should wage. To eradicate these sources of contagion we should have first and before all things, a thorough system of meat and milk inspection in every municipality in this broad land. Not the mere espionage of an antiquated, ignorant butcher, or of some one possessed of a political "pull," but a well-equipped and established public slaughter house,

where trained men would devote their lives and energies to the inspection of all animals killed and the meat thereof. Experts who were trained in the pathology of our meat-producing animals, whose one aim should be to protect the citizens of their city from the chance of becoming poisoned or diseased by the ingestion of noxious flesh.

The dairies of the environing country should also be under the rigid control of skilled men, well versed in the infectious and contagious diseases of animals. The milk man should be made to not only guarantee his client a certain percentage of solid constituents of butter fat, but should also be compelled to have his cattle herd subjected to a thorough, searching examination at stated periods, that he may be able to assure his customers that the milk he leaves at their door is free from the taints of disease, especially of the death-dealing Tuberculosis.

This latter is only now possible in that we have in that grand discovery of Koch an agent, though not always infallible, upon which great reliance can be placed to unearth bovine Tuberculosis in its latent, incipient forms.

PRESIDENT'S ADDRESS

Before the Fourth Annual Meeting of the Ohio State Dairy Association.

[By Prof. Thomas F. Hunt, Ohio State University.]

It is my purpose tonight to review briefly, state and national legislation of the past year as it affects the dairy interests of Ohio.

To begin with state legislation, the act to regulate the sale of milk was amended on April 14, 1896, so that legal milk hereafter shall contain not less than 12 per cent. solids in place of 12 1-2 per cent, as heretofore, not less than one-fourth of which must be fat, except during the months of May and June, when milk containing not less than 11½ per cent. of milk solids instead of 12 per cent. as heretofore. Inasmuch as we do not buy milk for the water which is in it but for the solids which it contains, it is evi-

dent that the consumer who heretofore got eight cents worth of milk may now only get seven cents worth when buying equal measure.

On March 3, 1896, an act was passed by the state legislature requiring that "All compounds made in imitation or semblance of cheese, and not made exclusively and wholly of milk or cream with salt, rennet, and with or without harmless coloring matter, but containing no fats, oils or grease not produced from milk or cream, shall be labeled 'Filled Cheese,' and all cheese made exclusively from milk or cream with salt, rennet and with or without harmless coloring matter and containing less than 10 per cent. of pure butter, shall be labeled 'Skimmed Cheese.'" This bill further provides that "Every manufacturer of full milk cheese may put a brand upon such cheese so manufactured, indicating full milk cheese, with the date and year when made, and no person shall use such brand upon any cheese made from milk from which any of the cream has been taken." So far as this bill relates to filled cheese, it has been made unnecessary by subsequent action of the national government which I will presently mention. Doubtless the position that Ohio took on the question of filled cheese influenced national legislation.

So far as this act relates to skimmed cheese it is worse than a farce. Cheese made from full milk will contain, on an average, more than one-third butter fat and will never contain less than one-fourth butter fat. No cheese made from ordinary milk, that is, milk of 3 per cent. fat or over, will contain less than 25 per cent. of butter fat unless the milk has been skimmed. No cheese will contain less than 10 per cent. of butter fat unless from two-thirds to three-fourths of the butter fat had been removed from the milk before the milk was used for making such cheese. Such a law is worse than useless, because few persons would think of making such cheese. Such cheese would usually remind us of the famous Suffolk cheese, "so hard that pigs

grunt at it, dogs bark at it, but none dare bite it." Bloomfield thus writes of this cheese:

"Mocks the weak effort of the bending blade,

Or in a hog-trough rests in perfect spite,
Too big to swallow and too hard to bite."

I am aware that the chemists for the Ohio State Dairy and Food Commissioner have analyzed some cheese containing less than 10 per cent. of butter fat which did not answer to the above description and might possibly be palmed off on the unsuspecting public, while in a semicured condition, as fair cheese. It is only necessary to allow a bit, which is more than one-half water, to dry in order to thoroughly condemn it. This act concerning the skimmed cheese which is certainly a step in the right direction, is a dangerous one, because it gives legal sanction to cheese containing from 10 to 25 per cent. of butter fat and, by inference, indicates that such cheese is not skimmed cheese, though, as a matter of fact, it is.

We give below the analyses of four cheeses in the annual report of the Ohio Dairy and Food Commissioner for 1895. Two of these cheeses are skims of the worst sort, containing less than 10 per cent. of butter fat. One contains 13 per cent., and the other, purporting to be a full cream cheese, contained $24\frac{1}{2}$ per cent. of butter fat. We also give the average analysis of full cream cheese as found by the experiment stations. To show the difference in value of these cheeses, we give their food value expressed in heat units or calories, and their relative value, calling the average cheese 100.

RELATIVE FOOD VALUE OF CHEESE.

	Water.	Ash.	Caseine and Sugar.	Fat.	Heat units.	Relative food value	Commercial value.
Average cheese.	33.25	2.10	29.15	35.50	204,000	100	9.5
Full cream so called.....	34.22	3.2	36.00	24.5	170,000	83	6.8
Part skimmed cheese.....	53.1	3.9	35.7	13.0	121,000	59	4.0
Skimmed cheese	60.01	4.89	32.35	2.6	71,000	34	1.3
Skimmed cheese	53.90	5.5	36.80	0.7	71,000	34	0.9

The relative food value is based upon the number of heat units each cheese contains. It will be observed that No. 3, marked part skim cheese, would be worth but six cents, when an average cheese was worth ten cents. Probably two-thirds of the butter fat had been removed from the milk before it was used for cheese making, and yet it would not be branded skim cheese under the law.

No. 2, which was sold as a full cream cheese was a night skim, or it was made from milk below the legal standard, or it had been skimmed in the making. This cheese is worth in heat units 8 1-3 cents, when average, full milk cheese is worth 10 cents. It is possible to make such cheese from the 3½ per cent. milk after one pound of butter has been taken from the night's milk. We believe that there is something to be said in favor of the proposition that night skims are necessary for self-protection and even self-preservation in the present state of the trade. We are not denouncing men who practice it for these reasons, but we do ask them to join hands with us in trying to remedy the conditions, and we do assert that the law which passed the last legislature not only protects the man who takes a pound of butter from his night's milk on the plea that he must compete with York State cheese, but it protects the man who takes all the butter fat out of his night's milk and then takes some more out in the morning and replaces with consummate skill, that we cannot but admire, the butter fat that the cheese should contain with that health-giving fluid, water.

While the branding of full cream cheese and the protecting of that brand by law in some measure protects the manufacturer of high class goods, it does not after all reach the heart of the difficulty. On December 22nd, 1896, the wholesale market at Cleveland for York State cheese was 10½ to 11½ cents, for new Ohio cream cheese was 10 to 11 cents, and for Ohio State, new, 9½ to 10 cents. Ohio State cheese was therefore 1 to 1½ cents below New York State cheese. Un-

doubtedly much of the Ohio State cheese is manufactured by the same process as the New York State cheese and is equal in quality, and the manufacturer should receive an equal price, but the reputation of Ohio for making skimmed cheese is such as to lose to its manufacturers from 1 to 1½ cents per pound, and as nearly 20,000,000 pounds of cheese are manufactured in Ohio annually, this means a loss of from \$200,000 to \$300,000 annually, not to the cheese manufacturers, who are paid so much per pound for manufacturing the cheese, and an additional price per pound for manufacturing the butter skimmed from the milk before it is made into cheese, but a loss to the farmers who produce the milk. What we need to do in this state is to raise the reputation of the cheese so that when you go to market to buy good cheese you are not ostensibly sold New York cheese, and so that our hotels will not print on their bills of fare York State cheese, but instead Buckeye cheese. A step in this direction, I believe, would be an amendment to the act which we have just been discussing, which shall read as follows: "All cheese made exclusively and wholly from milk or cream with salt, rennet, and with or without harmless coloring matter, and containing less than 20 per cent. of pure butter fat, shall be labeled 'Skimmed Cheese.'" The act which we have just been discussing requires that every guest and patron of hotels, restaurants, or lunch counters, shall be notified when he is served with filled cheese or skimmed cheese. On February 13, 1896, the state legislature also amended the act concerning the manufacture and sale of oleomargarine, to the effect that "every proprietor, keeper, manager, or person in charge of any hotel, boat, railroad car, boarding house, restaurant, eating house, lunch counter, or lunch room," who serves oleomargarine in any manner, either in cooking or otherwise, shall display a card in a conspicuous place: "Oleomargarine sold and used here."

On April 10th, 1896, Representative Hopkins, of Illinois, said, referring to the so-called filled cheese bill, in the House of Representatives of the United States Congress: "This is one of the most important bills that comes before this house at this session." The extended discussion which followed upon the bill on April 9th, 10th and 11th in the House of Representatives and the subsequent discussion in the Senate shows that many other members of Congress were of the same mind. This bill, which is now a law, defines filled cheese as follows: "All substances made of milk or skimmed milk, with the admixture of animal oils or compounds formed of such milk and made in imitation or semblance of cheese." Under this bill the manufacturer is taxed \$400, the wholesale dealer is taxed \$250, and the retail dealer \$12. On all filled cheese there is assessed and collected a tax of one cent per pound. Imported filled cheese must pay an internal revenue tax of eight cents per pound in addition to any import duties which may be imposed. Any filled cheese which is adjudged deleterious to the public health shall be forfeited to the United States. It should perhaps be mentioned that the wording of this bill prevents the addition of any foreign substance to full milk cheese, as is often done in potted and other forms of fancy cheese. This was not the intention of the bill and it is unfortunate that the bill was not more carefully worded in this particular. While this subject was pending in Congress, the officers of your association were active in urging the passage of this bill. Two circulars were sent out, signed by the President and Secretary of your Association, calling upon the farmers of the state who were interested in pure dairy products to work for the passage of this bill. Your President appeared before the sub-committee of the Committee on Ways and Means in the House of Representatives and he can testify from what he there learned that the dairymen of the state had heeded the circular which had been sent out,

and that the petitions which were poured in upon the committee as a result of this circular were not without influence.

From this somewhat disconnected survey of recent legislation I think that it will be seen that the dairy interests of Ohio have all the protection against surreptitious sale of oleomargarine and filled cheese which can be properly asked for, provided the laws are enforced. There can be no objection to any one using either one of these substances, provided they know what they are using. What we have left to do to improve the dairy interests of Ohio is to improve the reputation of the dairy products which we have to sell, especially those which we export beyond our borders where we come into competition with the products of other states. We produce nearly 60,000,000 pounds of butter annually. Ohio creamery butter sells from $1\frac{1}{2}$ to 3 cents per pound below Elgin butter. Creamery men who sell fancy butter upon the Cleveland market must take 3 cents a pound less than Elgin butter, simply because it is made in Ohio. Of course, all butter is not made in creameries, but I believe that it will be no exaggeration to say that we get 3 cents a pound less for the butter made in Ohio than we should do, because of our reputation as butter makers. If this is so, it means a loss of nearly \$2,000,000 annually to the farmers of the state of Ohio. Can we not do something to raise the standard of butter and cheese in Ohio? And is there any better way to do so than by making better butter and cheese than we have been making?

Forcing Cucumbers.

L. R. Taft.

During the spring and early summer, after the time when lettuce can no longer be grown with success in forcing houses, there is still an opportunity for growing cucumbers and tomatoes with profit, as the houses can be used for nothing else at that time, and there will be but a small expenditure for fuel. In the winter, the expense of keeping up the necessary high

temperature in the houses will be very large and the prices sometimes run very low. It is a winter specialty with gardeners under glass near Boston, New York and Philadelphia that has been very profitable and may be again, but like other good things, it is in danger of being overdone.

When these crops are grown in beds, a crop of beans or lettuce can be taken off before the entire space will be needed by the vines. If either cucumbers or tomatoes are grown in solid bunches to follow a lettuce crop, the growth of the plants can be hastened, and fuel can be saved, by digging trenches under where the rows of plants are to be set, one foot wide and deep, and filling with fresh horse manure. This will gradually decompose and will furnish bottom heat to accelerate the growth of the plants and later on supply food for the development of the crop of fruit.

In houses with wide beds, it will be well to have the rows at least three feet apart, while five or six will be preferable, and to grow the plants with two in a pot or box, setting them three feet apart in the rows, and training the plants in opposite directions. Between the rows the trellises are placed. These consist of wire one foot apart upon either side of an A-shaped framework extending nearly to the glass. The vines will be trained up on either side and it will form a series of galleries, within which the cucumbers can be gathered and the vines tended.

For use in ordinary even span houses, with a wide bed in the center and narrow ones on the sides, a good method is to plant two rows in each of the side beds and four in the center, at intervals of two feet each way, but so that the plants in one row will stand halfway between those in the adjoining rows.

The wires, each of which is to support one of the vines, are placed one foot apart and run from the walls to a point below the ridge at a distance of from 10 to 12 inches below the glass. Stakes or strings are used to support the vines until they have reached the wires upon which they

are to run. When the vines in the outer rows have reached a point over the edge of the center bed, they should be pinched off, as should those in the center bed when they reach the ridge. This will cause side shoots to be sent out, upon which the fruit will be formed.

In order to secure the development of fruit upon most of the common varieties of cucumbers, artificial fertilization of the flowers must be resorted to when they are grown in forcing houses during the winter, unless a hive of bees is placed in the house for the purpose of carrying the pollen from the staminate flowers to the pistillates. It can be done by taking the pollen upon a small brush and dusting it over the pistils, and will be necessary unless some of the English forcing varieties are grown. They will develop without pollen, and it is thought by some growers that they should not be pollinated, as it is likely to cause an enlargement at the ends of the fruit. Of course the seeds will not fill out unless the flowers are fertilized and this will be an improvement in addition to what is gained in the improved form of the fruits and in labor.

As the fruits develop, the larger ones should be supported by slings of raffia to relieve the vines of their weight and prevent their being torn down from their supports, but if the vines are carefully tied to the trellis with raffia the ordinary varieties can be grown without tying up the fruits. The crop should be ready for market in from sixty to eighty days from the date of sowing the seed. For most markets the common garden varieties are the only ones that are profitable, the White Spine and a strain known as Arlington White Spine being most commonly grown.

NEW USE FOR CORN STALKS.

How a New Industry Expects to Use a Large Part of the Next Crop.

A wealthy firm of Philadelphia ship builders is investing \$100,000 in fitting out a factory at Rockford, Ill., for converting corn stalks into coffer-dam for

the sides of war ships, and food for cattle. Before the corn crop of next fall shall have been gathered in, it is expected several other factories with newly invented machinery will be built in the midst of the corn belt, where charge for transportation will be at a minimum for the farmers who raise the corn. The uniform price to be paid for corn stalks is \$2 a ton.

A material made by a patent process from the outer covering of corn stalks will be used to stuff the sides of naval vessels. When the shot passes through the ship's side the water in entering the hole has the effect of swelling the corn stalk stuffing, and this closes the leak and prevents enough water entering to sink the ship.

When Mr. E. S. Cramp, of Philadelphia, the chief promoter of the new enterprise, was asked about it by a Chicago Post reporter he said: "We separate the pith from the outer stalk. The latter is used to make the warship padding and the pith is converted into food for cattle. Thus there is no waste whatever. The process is one of separation and grinding, and is not complicated. Having equipped a factory with the machinery, about all that is necessary is for the men to put the bare stalks in at one end and take out the stuff at the other. In November—on Thanksgiving day—our patents were granted. I have just completed contracts with the American Spirits Manufacturing Company to feed all their cattle with this substance. They consider it a very valuable food in place of what they have used hitherto.

"For packing, filtering and ventilating purposes the cofferdam material is useful, too, but these are only minor uses to which it may be put. As to the price that is to be paid for the stalks, it will be \$2 a ton. This is enough to make it profitable for those who raise the corn, for we do not want the leaves, etc. All that is necessary is the bare stalk. Thus, after husking the corn, farmers may let the cattle into the field as they do now, and when the cattle have consumed the

leaves and all they can eat, the stalks can be brought to our factories. Nothing we need has been put to any use in the past. There are two or three tons of corn stalks to the acre, which can be cut for about \$1 an acre, leaving the rest to the farmer. A goodly portion of the corn stalk crop of 1879 will be used by us. We intend to invest a large amount of capital in making use of the invention, and build factories from year to year in favorable locations throughout the West, so that there will be no expense for transportation to most of those who furnish the product."

Roller Bearings and Light Drafts.

This is the title of the last catalogue of the Deering Harvester Co., just recently issued. It contains the testimonials from several colleges and experiment stations where the Deering machines are meeting with such inimitable success. All of these colleges and experiment stations endorse the system of roller and ball bearings on these machines. In fact, it is our belief that roller and ball bearings upon farm implements will soon occupy a prominent place and will prove a most important factor in reducing draft.

The Deering Harvester Co. in 1892 applied roller bearings to a limited number of its machines, sold them where it was deemed they would receive the most severe usage and watched them with the greatest care. The success of these was such that the following year a large number of these machines were thus equipped and these proved so completely satisfactory that the following year the roller-bearing system was extended to all Deering binders, and for the last two years it has been in all of these machines. Last year for the first time competitors began imitating the roller bearings, and we are informed the coming season almost all of the harvesting companies will have these bearings in some form or other in their machines as talking points. At first the Deering Co. was most violently opposed in the adoption of ball

and roller bearings by other harvesting concerns, and now those who most violently opposed them are imitating after a lapse of five years; in fact, roller bearings have triumphed completely and we think it no risk to predict that the time is not very far distant when all farm machines, including heavy wagons, will have to be equipped with roller bearings to meet the demand of a thoroughly awakened agricultural public.

Another item of very great importance is the fact that the Deering twine mills last year supplied one-third of all the twine manufactured and sold in all America, besides sending large quantities to Europe and other foreign lands. The first binder twine ever made was Deering twine, just as the first binder ever made was the Deering binder, and it is indeed fitting that the pioneers in the manufacture of both harvesting machines and binder twine should still be the leaders both in quantity and quality of such goods at the present day. There are some interesting facts as to the manufacture of binder twine; for instance, the fact that thirty miles of twine are made every working minute is almost beyond comprehension, while the fact that the Deering mills make ninety tons a day of this twine that will average 600 feet to the pound gives one an idea of the magnitude of this industry.

The Deering Harvester Company works employ 3,500 men, and have a capacity of turning out one machine every minute. The works are pushed to their full capacity almost all the year round. In the last three years the works have had a vacation of only one week in any one department, while most other harvesting concerns close down from one to four months almost every year.

While the political pot was boiling last fall and competing concerns were idly waiting, or still more idly bewailing, the "uncertainty of the times," in the newspapers, the great Deering works were hammering away on the 1897 output, strong in the confidence that, no matter what political party prevailed,

there would be grain to cut in 1897, and that Deering machines and twine would be demanded to handle it. Though this great plant has a capacity of one finished machine and thirty miles of binder twine every working minute, there was the feeling that the manufacturing minutes were precious, and not one dared be wasted if the demand for Deering goods in the coming season were to be supplied.

Notes.

That the world still moves is shown by the advantages of the farmer of to-day over the farmer of fifty years ago. At that time everything that the farmer learned was acquired through bitter experience or by diligent inquiry. To-day the farmer needs but to send a subscription price of \$1.10 for a year's subscription to the *RURAL NEW YORKER* and *AGRICULTURAL STUDENT*,—a pair of wide-awake, up-to-date newspapers, containing all of the latest investigations in the science of farming.

Covering the strawberry beds in winter must not be overlooked, if the soil has been cultivated (as it should have been) during the summer to keep down the weeds. Where no cultivation was given the grass and weeds will be protection enough—a poor way of raising strawberries but better than not raising any at all. Straw makes a good covering, and it should be applied (about three inches deep) when the ground is frozen, about the beginning of January, when winter has fairly set in. The injury that occurs if not covered is less from the cold than from repeated freezing and thawing.

All the roses will be benefited by a forkful or two of manure thrown on the surface around each plant. The tender ones, Bourbons and others, in the open ground will need, first, to be laid down on the surface and to have a covering of earth or sods (the latter is preferable) on top of them. The covering need not be done until about Christmas, when winter has become fully established.